8-24 ROCK AND GRAVITY BLOCK WALL AND GABION CRIBBING

8-24.1 Description

This Work consists of constructing rock and gravity block wall(s), and gabion cribbing in accordance with the Plans, Special Provisions, these Specifications, or as designated by the Engineer.

8-24.2 Materials

Materials shall meet the requirements of the following Sections:

Rock for Rock Wall and Chinking Material	9-13.7(1)
Backfill for Rock Wall	9-13.7(2)
Gabion Cribbing	9-27.3
Wire Mesh Fabric	9-27.3(1)
PVC Coating for Welded Wire Mesh Fabric	9-27.3(2)
Gabion Basket Fasteners	9-27.3(4)
Stone	9-27.3(6)
Construction Geotextile	9-33

Materials for gravity block walls shall be as specified in the Special Provisions.

8-24.3 Construction Requirements

8-24.3(1) Rock Wall

8-24.3(1)A Geometric Tolerances

The completed wall shall meet the following tolerances:

1. Wall batter shall be 6:1 or flatter as specified in the Plans.
2. The exterior slope plane and grade in the finished surface of the wall shall be plus or minus 6-inches.
3. The maximum void between adjacent rocks shall be 6-inches as measured at the smallest dimensions of the void within the thickness of the wall.

8-24.3(1)B Excavation

Excavation shall conform to Section 2-09.3(4), and to the limits and construction stages shown in the Plans.

The Contractor shall restrict the excavation limits to the length of rock wall that can be constructed in 1-day's Work, except as otherwise noted. The Engineer may permit excavation beyond the limits that can be completed in 1-day's Work provided the Contractor either demonstrates that the excavation will remain stable until the rock wall is completed, or shores the excavation in accordance with Section 2-09.3(4).

Slope above the rock wall shall be established prior to excavating for the wall.

8-24.3(1)C Foundation Preparation

The foundation for the wall shall be graded as shown in the Plans.

Prior to rock placement, the foundation, if not in rock, shall be compacted as approved by the Engineer. Any foundation soils found to be unsuitable shall be removed and replaced in accordance with Section 2-09.3(1)C.

Base course rocks shall have full contact with the foundation soils. If necessary, the excavation shall be shaped to fit the rocks. Rocks may be dropped to shape the ground provided the rocks do not crack. Cracked rocks shall be replaced and the foundation regraded to fit the replacement rock.

8-24.3(1)D Construction Geotextile

Construction geotextile shall be of the type, and shall be placed, as shown in the Plans.

8-24.3(1)E Rock Placement and Backfill

Rocks shall be placed so there are no continuous joint planes in either the vertical or lateral direction.

Where possible, rocks shall be placed so that the rock shall bear on at least 2 rocks below it. Rocks shall be oriented so that flat surface contact points between adjacent rocks are maximized. Point-to-point contact between adjacent rocks shall be minimized. Each rock in a course shall be arranged so that the natural irregularities in the rocks key the rocks together and so that the courses are keyed together.

Rocks shall increase in size from the top of the wall to the bottom at a uniform rate. The minimum rock sizes, as referenced from the top of the wall, shall be as follows:

Depth from Top of Wall (feet)	Minimum Rock Size at Depth from Top of Wall
6	Three Man
9	Four Man
12	Five Man

Rocks at the top of the wall shall be Two Man or larger.

Where voids larger than 6-inches are present, chinking rock shall be keyed between the rocks to fill the void.

Backfill for the rock wall shall be placed behind each course and tamped to provide a stable condition prior to placing rocks for the next successive course.

For rock walls constructed in fills, the fill shall be overbuilt and cut back to construct the wall.

8-24.3(2) Gravity Block Wall

Excavation shall conform to Section 2-09.3(4), and to the limits and construction stages shown in the Plans. Foundation soils found to be unsuitable shall be removed and replaced in accordance with Section 2-09.3(1)C. Slope above the gravity block wall shall be established prior to beginning any excavation for the wall.

Gravity block walls are defined as a wall of modular blocks acting as a gravity wall to retain soil. The modular blocks may have features designed to interlock the blocks together. However there shall be no reinforcement of the retained soil nor any reinforcement connection between the modular blocks and the retained soil.

Gravity block walls shall be constructed as specified in the Special Provisions and as shown in the Plans.

8-24.3(3) Gabion Cribbing

8-24.3(3)A Foundations

Before placing any gabion cribbing, the Contractor shall excavate the foundation or bed to the specified grade in accordance with Section 2-09.3(4). Foundation soils found to be unsuitable shall be removed and replaced in accordance with Section 2-09.3(1)C.

8-24.3(3)B Baskets

Baskets may be fabricated from either woven or welded steel wire; however, a gabion Structure shall not include both. Baskets may be assembled with either lacing wire or clip fasteners; however, a perimeter or diaphragm edge shall not include both.

8-24.3(3)C Dimensions

The Contractor shall supply gabion baskets in the lengths and heights the Plans require. Each length shall be a multiple (double, triple, or greater) of horizontal width. Horizontal width shall be 36-inches. All baskets from the same manufacturer shall be the same width and shall be within a tolerance of 5-percent of the manufacturer's stated sizes.

8-24.3(3)D Fabrication of Baskets

Gabions shall be made so that the sides, ends, lid, and diaphragms can be assembled into rectangular baskets of the required sizes at the construction site. Common-wall construction may be used in gabion Structures up to 12-feet high. Common-wall construction includes any basket where its top serves as the bottom of the 1 above it, or where 1 wall also serves an adjacent basket. When gabion Structures are more than 12-feet high, the baskets shall have independent sides, ends, top, and bottom.

Each gabion shall be divided by diaphragms into cells the same length as horizontal basket width. Diaphragms shall be made of the same mesh and gage as the basket body.

All perimeter and diaphragm edges shall be laced or clipped together so that joints are at least as strong as the body of the mesh itself. The ends of the lacing shall be anchored by 3 tight turns around the selvage wire.

8-24.3(3)E Filling Baskets

Baskets shall be filled with stone. The stone shall be placed and compacted to meet the unit weight requirements of Section 8-24.3(3)F.

The stone shall be placed in compacted layers not more than 14-inches deep. If cross-connecting wires are required, the Contractor shall adjust the number and depth of layers so that wires occur between the compacted layers of stone.

8-24.3(3)F Unit Weight Requirements and Test

The unit weight of the filled gabion basket shall be at least 100-pounds per cubic foot. Should the unit weight be less than 100-pounds per cubic foot, the gabion will be rejected and the Engineer will require the Contractor to conduct and pass additional unit weight tests before completing other gabions.

The Contractor shall conduct either of the following unit weight tests to prove the density of completed gabions:

1. A filled gabion basket shall be selected from the completed Structure and weighed.
2. A gabion basket shall be filled with stone from a loaded truck that has been weighed. After filling, the truck and unused stone shall be weighed again. The difference between the 2 weights shall be used to determine the weight per cubic foot of the stone in the gabion.

The Contractor shall conduct 1 unit weight test for each 500 cubic yards of gabions placed. The Engineer may reduce the specified frequency of these tests provided the specified minimum unit weight has been consistently achieved.

In conducting unit weight test 1 or 2, the Contractor shall provide and use scales conforming to Section 1-09.2.

8-24.3(3)G Gabion Cribbing Erection

Each row or tier of baskets shall be reasonably straight and shall conform to alignment and grade. Hexagonal mesh baskets shall be stretched endwise before filling. The stone shall be carefully placed in layers, then tamped or vibrated. The last layer of stones shall fill each basket completely so that the secured lid will rest upon the stones. Each basket shall be laced securely to all adjacent baskets and its lid then laced or clipped to the sides, ends, and diaphragms.

All selvage wires of ends of adjacent baskets shall be laced together. The bottom selvage of the basket being constructed on a previously constructed basket shall be laced to the top of that basket.

Backfilling behind or around gabions shall conform to Section 2-09.3(1)E.

8-24.4 Measurement

Rock for rock walls and backfill for rock walls will be measured by the ton of rock actually placed.

Gabion cribbing will be measured by the calculated neat line volume of gabion baskets in place, using the manufacturer's stated dimensions.

Gravity block wall will be measured by the square foot of completed wall in place. The vertical limits for measurement are from the bottom of the bottom layer of blocks to the top of the top layer of blocks. The horizontal limits for measurement are from the end of wall to the end of wall.

Construction geotextile will be measured by the square yard for the surface area actually covered.

Structure excavation Class B, Structure excavation Class B including haul, and shoring or extra excavation Class B, will be measured in accordance with Section 2-09.4.

8-24.5 Payment

Payment will be made in accordance with Section 1-04.1 for each of the following Bid items that are included in the Proposal:

"Rock for Rock Wall", per ton.

The unit Contract price per ton for "Rock for Rock Wall" shall also include furnishing and installing chinking materials.

"Backfill for Rock Wall", per ton.

"Gabion Cribbing", per cubic yard.

"Gravity Block Wall", per square foot.

"Construction Geotextile", per square yard.
"Structure Excavation Class B", per cubic yard.
"Structure Excavation Class B Incl. Haul", per cubic yard.
"Shoring or Extra Excavation Class B", per square foot.